

EXERCISE 4 (cont.)**d Marine ecosystems**

- 2 Describe the actions which have been taken to protect the ozone layer.

Nuclear power

Every object in the world is made up of tiny particles called atoms which are held together by nuclear energy. Scientists have discovered how to release this nuclear energy which means there is an abundant supply of nuclear energy available for fuel. This energy can be used in a number of ways, but particularly for producing massive amounts of heat energy.

In the 1950s, nuclear energy was said to be a very safe and clean form of power and it was seen as the fuel source of the future. Since there were large supplies of the raw materials used to produce this type of energy, it was also claimed that it was 'too cheap to meter'. At present, nuclear energy makes up over 15% of the world's electricity production and 5% of the total energy consumption.

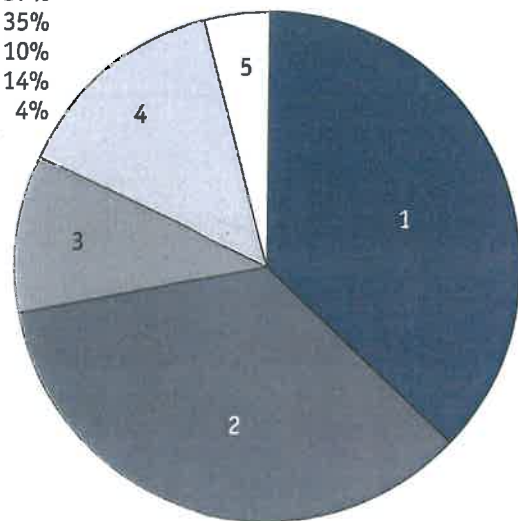


Figure 8.12 The nuclear energy file: major world users of nuclear energy

Despite all the claims that were made in the 1950s, uranium (the raw material used in nuclear energy production) gives off radioactive rays, which are invisible. This radiation can have positive effects, but it also has highly dangerous ones, including genetic changes, the attacking of living tissue, cancer and death. These negative effects have tarnished the name of nuclear energy as a major source of energy for the future.

Obtaining and producing nuclear energy

One of the major difficulties in the production of nuclear energy is controlling the *rate* of the nuclear reaction which produces the heat. If the reaction occurs too quickly, an explosion can occur, just as takes place inside an atomic bomb. Preventing leakage of deadly radiation from the nuclear reactor and how to dispose of the radioactive waste left after the nuclear reaction are two of the other concerns that have hindered nuclear energy's acceptance as a true 'fuel of the future'. The possible consequences of accidents at nuclear power stations have been well demonstrated by several examples in the last few decades.

Nuclear power plant accidents

The two most publicised power plant accidents have been Three Mile Island (Pennsylvania, USA) and Chernobyl (Ukraine, Russia) in 1986.

Chernobyl

The Chernobyl accident occurred on 26 April 1986 when the nuclear plant went into meltdown, meaning that the nuclear reaction went out of control and created so much heat that the power plant protection measures could not contain the radiation. Radioactive emissions from the plant continued for 10 days, spreading fall-out over much of Europe as the emissions were spread by the prevailing winds. Thousands of square kilometres of the best Ukrainian agricultural land was contaminated and 135 000 people living in a 35 km radius had to be evacuated immediately. The authorities decided not to resettle the evacuation zone.

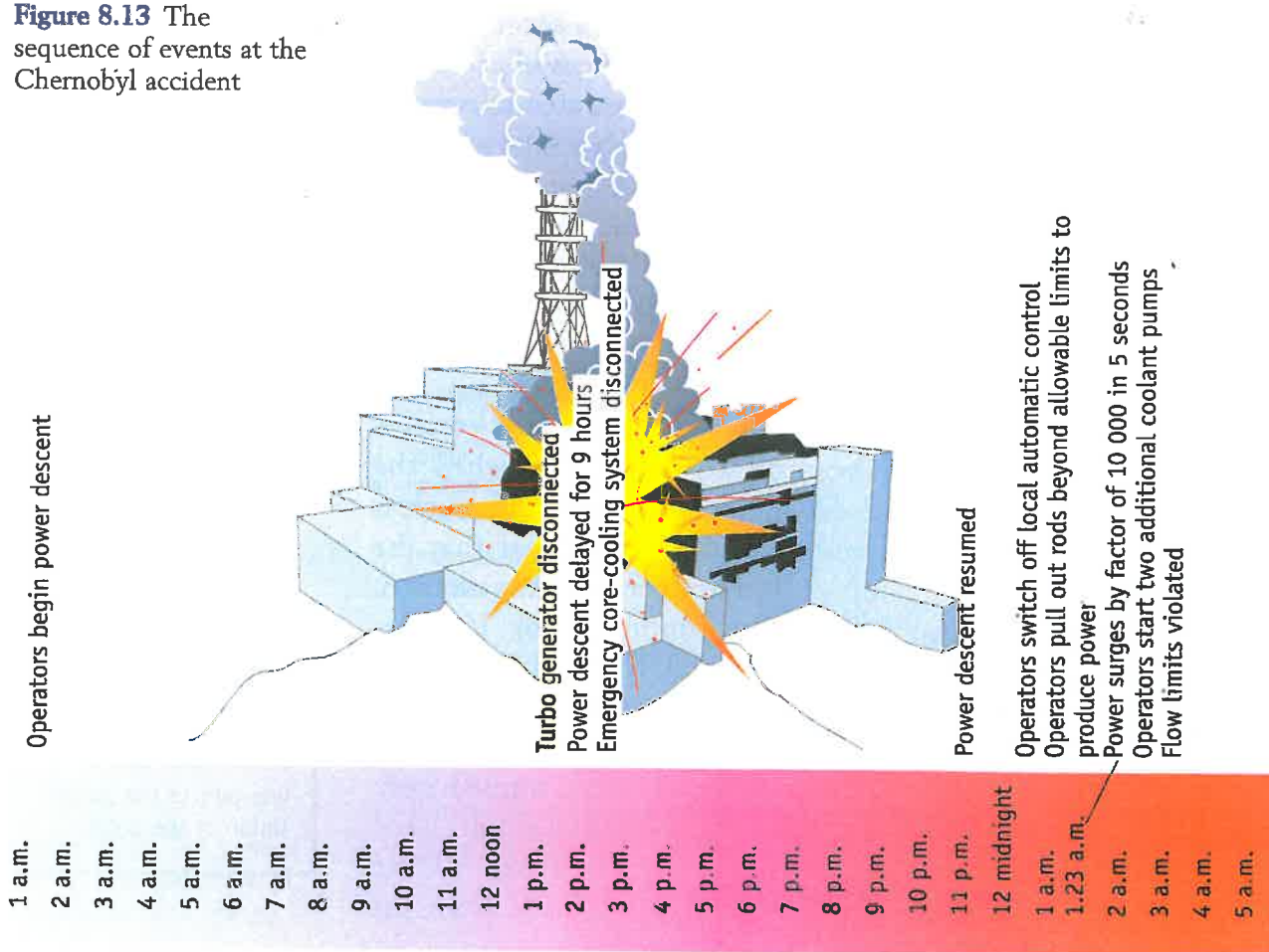
The immediate death count from this accident was 30 and hundreds of people were injured. Radiation produced from the

At the time, Russia was part of the Soviet Union or the USSR.

meltdown was spread widely by the prevailing winds. It is estimated that over 20 000 deaths will eventually occur worldwide from the Chernobyl accident and the radiation it produced, for the radiation has affected children who were born long after the event to people from the contaminated regions.

The cause of the explosion and the subsequent meltdown at the Chernobyl nuclear plant was a runaway nuclear reaction. Officials said that this accident occurred when the reactor system was being tested. It is believed that the plant's operators became confused, failed to heed warnings and therefore made several mistakes. A report showed that operators' errors, the test procedure being used and the original design of the reactor all contributed to the accident.

Figure 8.13 The sequence of events at the Chernobyl accident



EXERCISE 5

OPTION A

- 1 Investigate the processes that are involved in producing nuclear energy.
- 2 a Produce an annotated visual display showing how electricity is produced from a nuclear reactor.
b Add a section describing how the waste produced in a nuclear reactor is dealt with.
- c Research some of the new procedures of nuclear waste disposal that are being developed in the hope that a safe and permanent solution to the problem can be found.
- 3 Describe the social and environmental issues involved in nuclear energy production.

OPTION B

- 1 Research the Chernobyl reactor accident and the problems of nuclear power generation in more detail.
- 2 Use the information which you gather to write an essay in response to the following topic:
'Nuclear energy is an efficient way of producing power. If we used it to produce power in Australia, an accident would be unlikely and not as dangerous as the Chernobyl reactor accident.' Discuss.

Alternative energies for the future

It is clear from news reports all over the globe today that the world's most used energy sources, fossil fuels, are rapidly decreasing. Consequently, there is an urgent need to find alternative energy sources. However, any alternatives that are chosen need to be sustainable and create minimal damage to the environment. Will technological advances be able to supply the energy demands of the future at an affordable price? Which is more important: cost or the environment? Eventually, the global community may not be left with a choice.

Much has been written on many alternative sources currently in use, such as water power (**hydro-electricity**), Sun (**solar energy**), **wind** and **geothermal energy**. Other lesser known sources include the use of ocean waves, tidal energy and the organic alternative collectively referred to as **biomass**.

Perhaps the most important consideration for people today, though, is the concept of **energy conservation**, or cutting back on their use of energy. The choices we make in living our lives now and how we put the theory of energy efficiency into practice will determine our energy future.